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SEVERAL ASPECTS OF THE PHYSIOLOGICAL-HYGIENIC BASIS OF PROGRAMMED TEACHING OF ELEMENTARY SCHOOL CHILDREN

(Nekotorye aspekty fiziologo-gigienicheskogo obosnovaniya programmirovannogo obucheniya shkol'nikov mladshikh klassov)

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SEVERAL ASPECTS OF THE PHYSIOLOGICAL-HYGIENIC BASIS OF PROGRAMMED TEACHING OF ELEMENTARY SCHOOL CHILDREN

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The school is searching for ways to improve teaching methods. One method is programming with the use of various technical means. In programmed teaching increased intense activity of students is assumed, which can entail a greater neuropsychic load.

There is only one work dealing with the hygienic evaluation of programmed teaching of elementary school children (N. G. Samotolkina). In connection with this we studied the working capacity and functional reactions of students in primary grades using a programmed teaching method. Our purpose was to find out if this method causes excess fatigue of the students. Programmed lessons were devised by coworkers in the Department of Psychology of this Institute under the direction of Assistant Professor A. I. Rayev. The study was carried out during 3 quarters of the school year. We observed 20 obviously healthy children (10 from the experimental class and 10 from the control). The method of measuring out work in time was tested on 70 children in both classes.

In the 1967/68 school year we determined the mental working capacity of children in the 3rd grade during programmed teaching. It was established that despite more intense, but emotionally pleasant work following special teaching programs, no greater mental fatigue was observed than in children in the control class who studied the same material by the traditional method. The study conducted during the 1968/69 school year led to the conclusion that the length of programmed teaching (2 quarters of the year) has no negative effect on the working capacity of the students; programmed teaching is adaptable for students with different rates of progress (M. A. Zamkova and E. I, Krivitskaya).

During the 1969/70 school year, in the same 82nd school of the Petrograd

district of Leningrad, we studied the effect of physical training classes on the working capacity of these same students in the next grade under programmed teaching conditions. In the experimental class the subject being studied, "the Verb," was presented on 15 printed exercise charts devised by coworkers in the Department of Psychology and methodologists. The very same material was studied in the control class by the traditional method.

The level of working capacity was determined by studying dynamics of oculo- and audio-motor reactions: visual acuity (VA); relative vision using the polarized binocular visuometer of L. L. Dashkevich; reaction to functional tests (respiration and pulse rate); physiometric indices (spirometry and dynamometry); work measured out in time (Anfimov tables).

The studies were conducted in four schedule variants: 1st schedule--days with a programmed Russian language lesson in the experimental class and no physical training class; 2nd schedule--days with a programmed lesson and a physical training class; 3rd schedule--days with no programmed lesson but with a physical training class; 4th schedule--days with no programmed lesson and no physical training class. Indices were recorded on specific days of the school week before classes, after the 2nd class (the programmed lesson was always the 2nd) and at the end of the school day. 15 series of experiments were conducted, consisting of 8112 observations.

With the 1st schedule, the length of oculo- and audio-motor reactions in children in the experimental class was shortened, especially by the end of the school day. Thus, the length of oculo-motor reactions before school was 0.95± ±0.026 sec., and by the end of the school day 0.77±0.027 sec. In school children in the control class it was correspondingly lengthened from 0.96±0.036 to 1±0.037 sec. VA was 2.3% higher by the end of the school day in students in the experimental class, while in those in the control class it was reduced 2.4%. No marked shifts in pulse or respiration rate were recorded in students of either class. By the end of the school day, pulse was normalized; in students of the experimental class it was reduced from 91 to 85 per minute and in those in the control group from 87 to 80. No marked shifts in relative vision or spirometry and dynamometry data were found in children of either class.

Thus, with the 1st schedule, no increased fatigue was established for

students in the experimental class,

With the 2nd schedule, a shortening was observed in the length of oculo- and audio-motor reactions in children in the experimental class from 0.91±0.043 sec. before the start of lessons to 0.79±0.047 sec. by the end of the school day. The control class showed these reactions to be shorted also, from 1.1± ±0.046 sec. to 0.96±0.034 sec. When the physical training class was held outdoors, by the end of the school day initial VA was retained, pulse was normalized in both classes. No perceptible shifts in other determined functional and physiometric indices were found. Analyzing data from the Anfimov tables, we found the same shifts in children of both classes. The amount of work completed was approximately the same in the experimental and control classes. By the end of the school day a decrease was recorded in the number of errors. Coefficient K in students of the experimental class changed from 1.83 at the start of the school day to 1.87 at the end. Correspondingly, in children in the control class it was 1.8 and 1.85. Therefore, physical training classes held outdoors lead to the same positive shifts in students in both classes.

With the 3rd schedule, approximately the same positive shifts were also shown in students in the experimental and control classes. Oculo-motor reaction was shortened 0.14-0.18 sec., VA increased 0.6-2.3%, pulse dropped from 90 to 85 and from 95 to 79 per minute. The amount of Anfimov tables completed and the number of errors, coefficient K, changed insignificantly by the end of the school day in comparison with initial data (before classes).

With the 4th schedule, approximately the same shifts were fixed for students in both classes. A lengthening was noted in oculo- and audio-motor reactions of 0.1 sec. in the experimental class and 0.07 sec. in the control. By the end of the school day, in all those examined, a deterioration in VA was determined, coefficient K was reduced from 1.92 to 1.8 in the experimental class and correspondingly from 2 to 1.75 in the control.

When there was no programmed lesson in the schedule and no physical training class, the fatigue curve in children of both classes was of the same type and reflected the regular pattern by the end of the school day. It could also be established that the time it took the children to complete one page of the exercise chart depended on the position of the programmed lesson in the

school schedule: in the 1st lesson it took 71.4 sec., in the 2nd--75.6 sec., in the 3rd--79.2 sec. and in the 4th lesson--84 sec.

As the material in the excercise charts used in the programmed lessons was approximately the same in difficulty and volume, it can be concluded that the later the lesson in the school day, the longer time the children take to complete it.

At the same time, psychologists (A. I. Rayev et al.) working with the same classes in the same school came to the conclusion that formation of mental activities and muscle development proceeded more successfully in the experimental class than in students in the control group. Thus, correct factual completion of work on the given subject was 92% in the experimental class and 81% in the control. The required complete oral formulation was given by 78% of the students in the experimental class and only 11% of the control. The correct sequence of completing and naming all operations was noted in 88% of children in the experimental class but was absent in students in the control group.

Conclusions

1. Programmed lessons do not reduce the working capacity of students throughout the school day.

2. A physical training class, conducted out of doors, has a positive effect on all students, either studying by programmed or ordinary methods.

3. When the school day contained no programmed lesson and no physical training class, approximately the same typical fatigue curve, regularly increasing until dismissal, was noted in students of both the experimental and the control classes.

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